CLAIMS

What is claimed is:

1. A mixed flow exhaust nozzle for a jet engine, comprising:

a tubular final nozzle having a downstream edge portion through which exhaust flow from said jet engine exits said tubular final nozzle; and

said downstream edge forming a beveled edge comprising an angle of greater than about 5 degrees relative to a reference plane bisecting said downstream edge portion, the reference plane extending orthogonal to a longitudinal axis of the tubular final nozzle.

2. The exhaust nozzle of claim 1, wherein the beveled edge comprises an angle of between about 5-45 degrees relative to the reference plane.

3. The exhaust nozzle of claim 2, wherein the tubular final nozzle has a main body portion that tapers from an upstream portion to said downstream edge portion.

4. The exhaust nozzle of claim 1, wherein said downstream edge includes first and second portions, said first portion forming a plane parallel to said reference plane, and said second portion forming said beveled edge.

5. The exhaust nozzle of claim 1, wherein the beveled edge comprises an outermost edge portion, said outermost edge portion being oriented at approximately a bottom dead center position.

6. The exhaust nozzle of claim 1, wherein the beveled edge comprises an outermost edge portion, said outermost edge portion being oriented at a midpoint between oppositely arranged top dead center and bottom dead center positions on the downstream edge.

7. The exhaust nozzle of claim 1, wherein the downstream edge portion further comprises a non-linear edge with more than one bevel angle.

8. The exhaust nozzle of claim 1, wherein the downstream edge portion further comprises a curving edge.

9. A mixed flow exhaust nozzle for a jet engine, comprising:

a tubular final nozzle having a downstream edge portion through which exhaust flow from said jet engine exits said tubular final nozzle; and

a primary nozzle disposed concentrically within the tubular final nozzle;

said downstream edge of said tubular final nozzle forming a non-linear edge.

10. The exhaust nozzle of claim 9, wherein the non-linear edge forms a curving edge.

11. The exhaust nozzle of claim 9, wherein the non-linear edge is oriented at a bottom dead center position of said tubular final nozzle.

12. A mixed flow exhaust nozzle for a jet engine, comprising:

a tubular final nozzle;

a primary nozzle disposed concentrically within said final nozzle;

said final nozzle including a downstream edge portion comprising a beveled edge.

13. The mixed flow exhaust nozzle of claim 12, wherein the beveled edge is oriented at an angle of greater than about 5 degrees from a reference plane extending orthogonal to a longitudinal axis extending through said final nozzle.

14. The mixed flow exhaust nozzle of claim 13, wherein the beveled edge is oriented at an angle of between about 5-45 degrees from the reference plane.

15. The mixed flow exhaust nozzle of claim 12, wherein the downstream edge comprises a non-beveled edge portion formed adjacent said beveled edge.

16. The mixed flow exhaust nozzle of claim 12, wherein the primary nozzle comprises a mixer nozzle.

17. A mixed flow exhaust nozzle for a jet engine, comprising:

a tubular final nozzle;

a primary nozzle disposed concentrically within said final nozzle;

said final nozzle including a downstream edge portion comprising a curved edge.

18. The mixed flow exhaust nozzle of claim 17, wherein said downstream edge includes both a beveled and curved edge portion.

19. The mixed flow exhaust nozzle of claim 17, wherein said curved edge forms a protruding edge portion oriented at a bottom dead center position on said final nozzle.

20. An exhaust nozzle for a jet engine, comprising:

a tubular nozzle member having a longitudinal axis;

a movable nozzle extension disposed outside the tubular nozzle member and disposed for movement along said longitudinal axis of said tubular nozzle member; and

said movable nozzle extension being movable from a retracted position disposed at least substantially outside said tubular nozzle member, to an extended position projecting outwardly from a downstream edge of said tubular nozzle member.

21. The exhaust nozzle of claim 20, wherein said movable nozzle extension includes a lip portion is arranged generally at a bottom dead center position of said tubular nozzle member.

22. The exhaust nozzle of claim 20, wherein said movable nozzle extension forms a beveled edge portion adjacent said downstream edge of said tubular nozzle member when said movable nozzle extension is in said extended position.

23. The exhaust nozzle of claim 20, wherein said movable nozzle extension forms a curving edge portion adjacent said downstream edge when said movable nozzle extension is in said extended position.

24. A method for forming an exhaust flow nozzle, comprising:

forming a tubular flow nozzle having a downstream edge portion through which exhaust flow from said jet engine exits said tubular flow nozzle; and

forming said downstream edge portion with a beveled edge comprising an angle of greater than about 5 degrees relative to a reference plane extending orthogonal to a longitudinal axis of the tubular flow nozzle.

25. The method of claim 24, comprising forming the downstream edge with a first portion that extends orthogonal to said longitudinal axis, and with a second portion adjacent the first portion that forms said beveled edge portion.

26. A method for forming an exhaust flow nozzle, comprising:

forming a tubular flow nozzle having a downstream edge portion through which exhaust flow from said jet engine exits said tubular flow nozzle; and

forming said downstream edge portion with a curving edge.

27. A method for forming an exhaust flow nozzle, comprising:

forming a tubular flow nozzle having a downstream edge portion through which exhaust flow from said jet engine exits said tubular flow nozzle; and

supporting a nozzle extension member for movement outside said tubular flow nozzle, the nozzle extension member being movable from a first position disposed at least substantially outside said tubular flow nozzle, to a second position projecting outwardly of said tubular flow nozzle.

28. A method for reducing noise generated from a jet engine, comprising;

mounting an exhaust flow nozzle adjacent a downstream end of a jet engine;

using a downstream edge of said exhaust flow nozzle to alter a flow path of exhaust flow exiting said exhaust flow nozzle such that an exhaust plume exiting said downstream edge is impeded from migrating below a bottom dead center position of said exhaust flow nozzle.